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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/682,007 | 07/09/2001 | LeRoy David Dickson | 07032001 | 2688 |

28703 7590 08/22/2003

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EXAMINER

CHANG, AUDREY Y

| | |
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| ART UNIT | PAPER NUMBER |
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2872

DATE MAILED: 08/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/682,007

Applicant(s)

DICKSON, LEROY DAVID

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **May 12, 2003** has been entered.
2. This Office Action is also in response to applicant's preliminary amendment filed on May 12, 2003, which has been entered as paper number 15.
3. By this amendment, the applicant has canceled claims 9-16 and has newly added claims 17-30.
4. Claims 17-30 remain pending in this application.
5. The applicant is respectfully reminded that **ALL of the amendments to the specification** submitted in the previous amendments have NOT been entered. If the applicant wished to have these amendments entered, a **substitute specification** is required to be submitted.

Response to Amendment

6. The amendment filed on May 12, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the newly submitted **claims 17 and 24** recite the phrase "uniformly high diffraction efficiency across substantially *all* of the wavelength range". The specification fails to give support for having uniform diffraction efficiency for **ALL** of the wavelength range but only for wavelength range between 1530 nm to 1570 nm, (please see Figure 10).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. **Claims 17-30 are rejected under 35 U.S.C. 112, first paragraph**, as based on a disclosure which is not enabling. *Bragg grating structure* is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The specification and the claims fail to teach how could a volume phase medium is capable of having diffraction efficiency without having any sort of diffractive structure.

9. **Claims 17-30 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims fail to teach how could a material is capable of having **material properties** that includes angle of diffraction, angle of deviation, peak modulation and diffraction efficiency. A material simply will not have such properties naturally. These properties are properties of a diffractive structure or grating **created or stored** within the material. They are not material properties, which occurs in nature. The specification and the claims also fail to teach how could the volume phase medium simply having diffraction angle and peak modulation that is capable of simultaneously maximizing the diffraction efficiency for both S and P polarization.

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The applicant is respectfully reminded that any material might have a simple variation in refractive index that serves as the “peak modulation value” however by having a simple variation in refractive index will not give rise to diffraction properties and will not give rise to the phenomena recited in the claims.

It is also not clear how could a “diffracted beam” (as claimed in claims 21 and 28) be created if there is no diffractive structure present at all.

10. **Claims 17-30 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The reasons for rejection based on newly added matters are set forth in the paragraph above.

Claim Objections

11. **Claims 24-30 are objected to because of the following informalities:**

(1) The phrase “an internal angle of deviation” recited in claim 24 is confusing and indefinite since it is not clear what is considered to be angle of deviation and it is not clear it is deviating with respect to what.

(2) The phrase “Kogelnik parameter v ” recited in claim 24 is not defined which makes the scopes of the claims unclear.

Appropriate correction is required.

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Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. **Claims 17-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Huang (PN. 5,486,934) in view of the patent issued to Kato et al (PN. 5,726,782).**

Huang teaches a *polarization independent coupling grating* (23, in Figure 2) that is a transmission type *phase volume hologram*, which serves as the *volume phase medium*. The coupling grating is adjacent and supported by a *support substrate* (27). Huang teaches that the phase volume hologram having a *medium thickness* (d) and a *periodic index modulation* n_1 that serves as the *peak modulation value*. The periodic index modulation corresponds to Bragg grating formed within the medium. Huang teaches that *the diffraction efficiencies* $\eta_{s,p}$ for the S and P polarization are stated as follows:

$\eta_{s,p} = \sin^2 v_{s,p}$ wherein the S polarization diffraction efficiency $v_s = (\pi d n_1 / \lambda (\cos \theta_{r2} \cos \theta_{r1}))$ is equal to the Kogelnik parameter v , and the P-polarization diffraction efficiency $v_p = v_s \cos(\theta_{r2} - \theta_{r1}) = v \cos(2\theta)$ with 2θ defined by the claims as the actual diffraction angle and θ_{r2} , θ_{r1} are the reconstructing beam angle and diffraction angle within the hologram medium, (please see formulas 1-3). This means that the S polarization diffraction efficiency is $\eta_s = \sin^2 v_s = \sin^2 v$ and the P polarization diffraction efficiency is $\eta_p = \sin^2 v_p = \sin^2 v \cos(2\theta)$. (please see column 1).

Huang further teaches that the thickness of the medium is about 17 micron that is less than 30 microns, and the diffraction angle is greater than 30 degrees. Huang teaches that the diffraction efficiency for the S and P polarization can be maximized simultaneously. Although this reference does not teach

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explicitly that the peak modulation value (n_1) is greater than 0.1 and is about 0.2 such value is either inherently met or an obvious modification to one skilled in the art to obtain desired diffraction efficiency for S and P polarization since Huang teaches explicitly that the peak modulation value is a parameter for designing and determining the diffraction efficiencies, (please see formulas 1-3 and Figure 4).

With regard to the features concerning the high dispersion, low polarization dependent loss and uniform high diffraction efficiency recited in claims 17 and 24, this reference does not teach such explicitly however since this reference teaches the phase volume hologram has the same "material properties" as recited in the claims, such features are therefore inherently include by the phase volume hologram.

This reference also does not teach explicitly to include a protective layer adjacent to the volume phase medium. However to use protective layer adjacent to volume phase medium such as a hologram is quite well known in the art as demonstrated by the teachings of Kato et al. Kato et al teaches a hologram having a base plate (501, Figure 18), a hologram medium (502A), a cover plate (511) that is coated with a nonreflection or anti-reflection coating (551). It would then have been obvious to one skilled in the art to apply the teachings of Kato et al to modify the polarization independent coupling grating of Huang to add protective or cover plate with anti-reflection coating adjacent to the recording medium for the benefit of preventing dust and the unwanted reflection enters the recording medium. The base and the cover plate are all transparent. With regard to the features concerning the specific surfaces being coated with anti-reflection coating and the specifics of the minimization of the loss, such features are either inherently met or obvious design choices to one skilled in the art for the benefit of minimizing the loss of the polarized light.

With regard to claims 18 and 25, Huang teaches that the phase volume hologram is recorded in medium comprises dichroic gelatin, (please see column 4, lines 3-6).

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With regard to claims 21 and 28, Huang teaches that the diffracted light is reflected at the surface of the base or substrate however it does not teach explicitly to include a reflective surface adjacent to the medium. However such modification would have been obvious to one skilled in the art for the benefit of ensuring good reflection property of the diffracted light being provided.

Response to Arguments

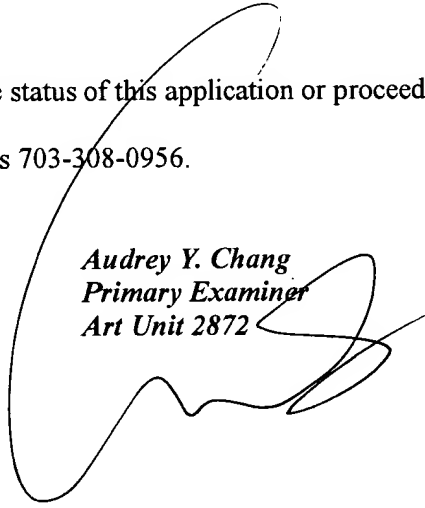
14. Applicant's arguments filed on May 12, 2003 have been fully considered but they are not persuasive. The newly submitted claims have been fully considered and they are rejected for the reasons stated above.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
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A. Chang, Ph.D.
August 12, 2003